

Ch 11 Area

11.1 Area of Parallelograms
11.2 Area of Triangles, Trapezoids,
and Rhombi

Area of a rectangle = bh

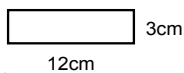
Area of a square = s^2

Area of a parallelogram = bh



Base and height are perpendicular

Example 1



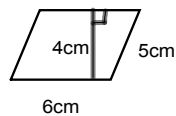
$$A = 12 \cdot 3$$

$$A = 36 \text{ cm}^2$$

$$P = 2(12 + 3)$$

$$30 \text{ cm}$$

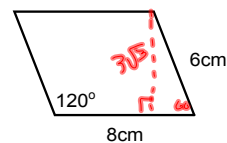
Example 2



$$A = 4 \cdot 6 = 24 \text{ cm}^2$$

$$P = 2(6 + 5) = 22 \text{ cm}$$

Example 3



$$\begin{array}{r|rr} 30 & 60 & 90 \\ 3 & 3\sqrt{3} & 6 \end{array}$$

$$A = 8 \cdot 3\sqrt{3}$$

$$24\sqrt{3} \text{ cm}^2$$

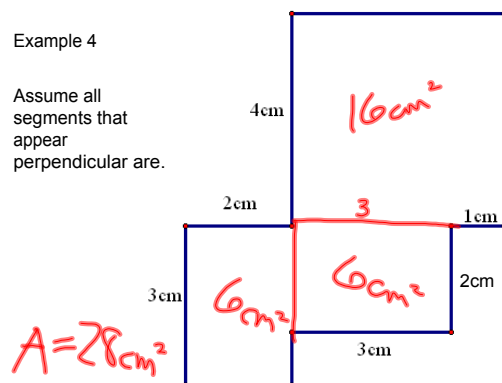
$$P = 2(8 + 6) = 28 \text{ cm}$$

$$\begin{array}{r|rr} 30 & 60 & 90 \\ \hline x & x\sqrt{3} & 2x \\ 4 & 4\sqrt{3} & 8 \\ 5 & 5\sqrt{3} & 10 \\ 3\sqrt{3} & 9 & 4\sqrt{3} \\ 5\sqrt{3} & 15 & 10\sqrt{3} \end{array}$$

$$\begin{array}{r|rr} 45 & 45 & 90 \\ \hline x & x & x\sqrt{2} \\ 2 & 2 & 2\sqrt{2} \\ 4 & 4 & 4\sqrt{2} \\ 3\sqrt{2} & 3\sqrt{2} & 6 \\ 5\sqrt{2} & 5\sqrt{2} & 10 \end{array}$$

Example 4

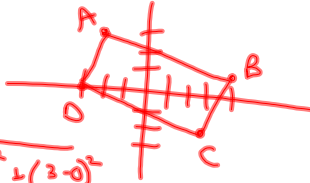
Assume all segments that appear perpendicular are.



Example 5

A (-2, 3)
B(4, 1)
C(3, -2)
D(-3, 0)

What shape is it?
Find the area.



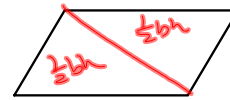
$$AD = \sqrt{(-2 - (-3))^2 + (3 - 0)^2} = \sqrt{1^2 + 3^2} = \sqrt{10}$$

$$AB = \sqrt{(4 - (-2))^2 + (1 - 3)^2} = \sqrt{36 + 4} = \sqrt{40}$$

$$A = \sqrt{10} \cdot \sqrt{40}$$

$$A = \sqrt{400}$$

$$A = 20u^2$$

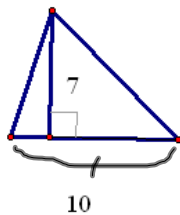


What is the area of this shape?
Cut it in half.

$$A = bh$$

Area of a Triangle = $\frac{1}{2}bh$

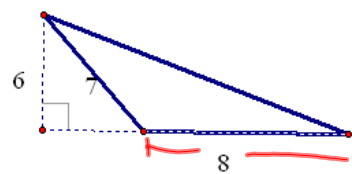
Example 1



$$A = \frac{1}{2} 7 \cdot 10$$

$$= 35u^2$$

Exam



$$A = \frac{1}{2} 6 \cdot 8$$

$$24u^2$$

Example 3

What is the length of \overline{AB} ?

Challenge

Find Area

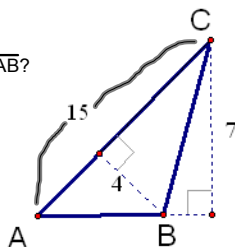
$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} 15 \cdot 4$$

$$A = 30u^2$$

$$30 = \frac{1}{2} 7 \cdot AB$$

$$8.6 \approx AB$$



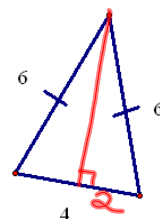
Example 4

$$6^2 = h^2 + 2^2$$

$$4\sqrt{2} = h$$

$$A = \frac{1}{2} 4 \cdot 4\sqrt{2}$$

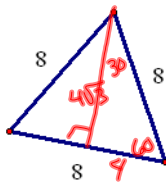
$$= 8\sqrt{2}u^2$$



Example 5

$$A = \frac{1}{2} 8 \cdot 4\sqrt{3}$$

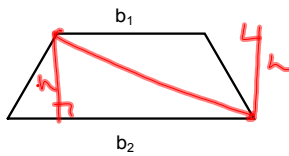
$$A = 16\sqrt{3} u^2$$



$$A = \frac{8^2 \sqrt{3}}{4}$$

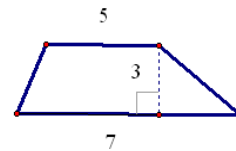
$$A = 16\sqrt{3} u^2$$

$$\text{Area of an Equilateral Triangle} = \frac{s^2 \sqrt{3}}{4}$$



$$A = \frac{1}{2} h b_1 + \frac{1}{2} h b_2$$

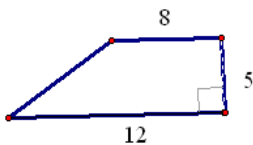
$$A = \frac{1}{2} h (b_1 + b_2)$$



$$A = \frac{1}{2} h (b_1 + b_2)$$

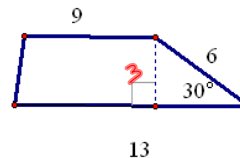
$$\frac{1}{2} 3 (5 + 7)$$

$$A = 18 u^2$$



$$A = \frac{1}{2} 5 (8 + 12)$$

$$= 50 u^2$$

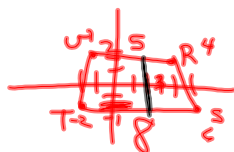


$$\frac{30}{3} \mid \frac{60}{3\sqrt{3}} \mid \frac{90}{6}$$

$$A = \frac{1}{2} 3 (9 + 13)$$

$$= 33 u^2$$

R(4, 2)
S(6, -1)
T(-2, -1)
U(-1, 2)



$$A = \frac{1}{2} 10(8)$$

Area of a Rhombus = $\frac{1}{2} d_1 \cdot d_2$



→ diagonals

M(0, 1) MNPR is a rhombus
N(4, 2)
P(3, -2)
R(-1, -3)



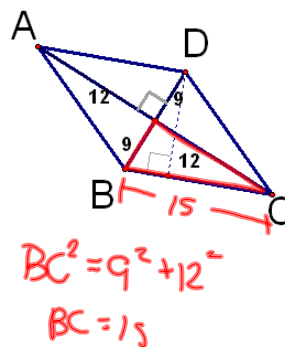
$$RN = \sqrt{\frac{(4-0)^2}{25} + \frac{(2-1)^2}{25}} = \sqrt{50}$$

$$MP = \sqrt{\frac{(3-0)^2}{9} + \frac{(-2-1)^2}{9}} = \sqrt{18}$$

$$A = \frac{1}{2} (5\sqrt{2})(3\sqrt{2})$$

$$\frac{1}{2} 15 \cdot 2$$

$$A = 15u^2$$



What is the area of the rhombus?

$$A = \frac{1}{2} 18 \cdot 24$$

$$= 216u^2$$

What is the height of the rhombus?

challenge

$$A = bh$$

$$216 = 18 \cdot h$$

$$12 = h$$